SESSION 2.2

AGENCY LOCAL INTERSECTION PROGRAM

GEORGE CHEN

Type 2070 Controller Software
By City of Los Angeles

Traffic Signal Control Program (TSCP)
Transit Priority System (TPS)
Startup Manager

Traffic Signal Control Program (TSCP) Overview

Installation

- 500 installed city-wide since 1997
- Used transit priority control intersections
- Used in complex intersection's traffic signal operations
- Used in CDPD communications enabled intersections

Enhancement to current ATSAC and ATCS systems in LADOT

- Compatible with existing infrastructures
- 16 System detectors per controller
- Communicate with UTCS systems
- Integrate with Light Rail System

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TSCP Software Features

Signal Control

- Eight-phase, dual-ring operation
- Restricted phase operation
- Six overlap with programmable parent, omit and no-start phases
- Programmable detector inputs and load-switch outputs
- Pedestrian service on all phases
- Volume density operation
- User programmable software logic
- Local Critical Intersection Control (CIC)

Coordination

- Nine local plans
- Four “On-Line” ATSAC plans
- Free and Flash operation
- Lead-lag operation by plan
- Sync phase, hold phase, and phase omit by plan
- 7-wire and Simplex modem master and slave operation
- Complex modem master and slave operation
- Plan verification prior to operation

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TSCP Software Features Continued

Time-of-Day

- Separate control for Time-of-Day functions and plan selection
- Six plan selection tables, each with 16 plan entries
- 16 fixed and 16 floating holidays
- Extensive “look-back” feature for plan selection
- Automatic Daylight Saving correction
- Solar clock and Hebrew calendar for sabbatical pedestrian recall

Detectors

- 32 programmable detectors (vehicle, bicycle or pedestrian)
- Up to 16 system detectors
- Vehicle detectors assignable to both phase and function
- Count, delay and extend timing on all detectors
- Red and yellow lock by detector
- Failure monitoring with automatic phase recall
- Failure recall times by detector

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TSCP Software Features Continued

Communications

- Compatible with ATSAC system
- Compliant with AB3418 protocol
- Supports external WWV time clock
- Compatible with simplex modem system (master and slave)
- New complex modem system (master and slave) with time and plan
- High speed EIA-232 (up to 38.4K bps)
- Programmable parity, data and stop bits

Preemption

- Two railroad and four emergency vehicle preempts
- Latching or non-latching preempt inputs
- Fully programmable delay, clearance, hold and exit phases and overlaps
- Three clearance intervals for railroad preempts
- Maximum emergency vehicle preempt timer

Transit Priority

- Programmable green extension and early green
- Programmable number of inhibit cycles
- Priority phase hold during free operation

Diagnostics and Utilities

- Event logging of all special conditions
- Input, output display and keyboard tests
- RAM checksums for each timing chart page
- Copy feature for phase timing, local plans, time-of-day tables and transit priority data

TSCP Operations

Main Menu:

```
                TSCP MAIN MENU
 1-Displays    4-Commands    7-Coordination
 2-Controller  5-Detectors   8-TOD Schedule
 3-Preemption  6-Comm/Logic  9-Utilities
```

Phase Timing Display:

```
                 PHASE TIMING            Pg 1/2
Phs   Interval    Time   Max  |     Demand
 2   GREEN REST    0.0    20  | VEH .2...6..
 6   GREEN REST    0.0    20  | PED ........
```

Communications Menu:

```
          COMMUNICATIONS DISPLAY
1-ATSAC Protocol     4-AB3418 Status
2-Simplex Protocol   5-WWV Protocol
3-Complex Protocol
```

Detector Menu:

```
           DETECTOR DISPLAY MENU
 1-Vehicle Counts     4-Failed Detectors
 2-Delay Timers       5-System Det Data
 3-Extend Timers
```

TSCP Operations

Utility:

```
                RAM CHECKSUM
   Page 2 = XXXX          Page 4 = XXXX
   Page 3 = XXXX          Page 5 = XXXX
    Pages referenced to Timing Chart
```

Cabinet Configuration:

```
    CABINET STATUS INPUT CONFIGURATION
    Input      Port         Input      Port
 Flash Bus    ›2.8‹     Flash Sense    6.7
 Door Ajar     6.1       Stop Time     6.8
```

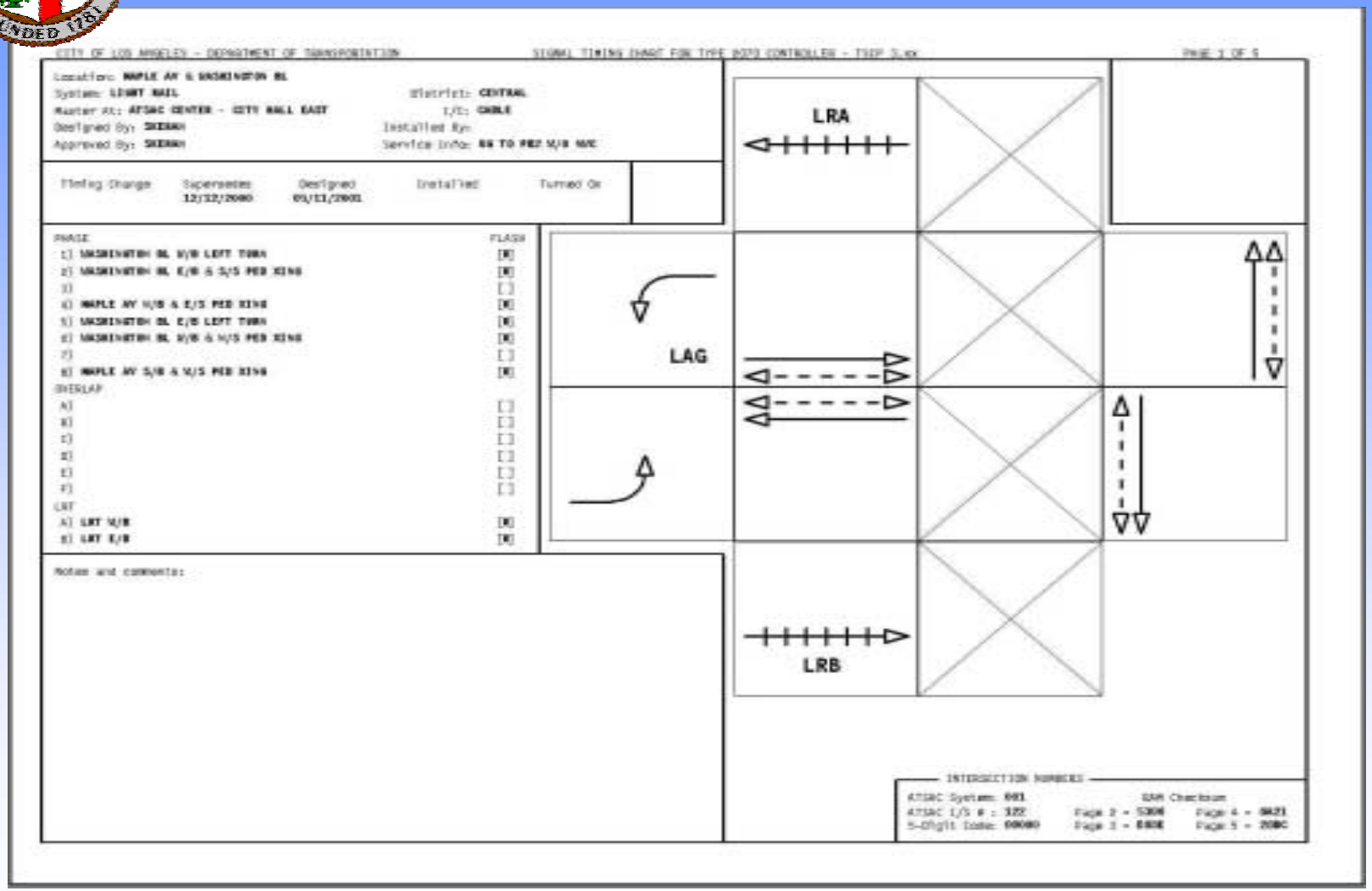
CIC Menu:

```
                CIC  PARAMETERS
1-CIC Enable
2-CIC Parameter Values
3-Detector-to-Phase Assignment
```

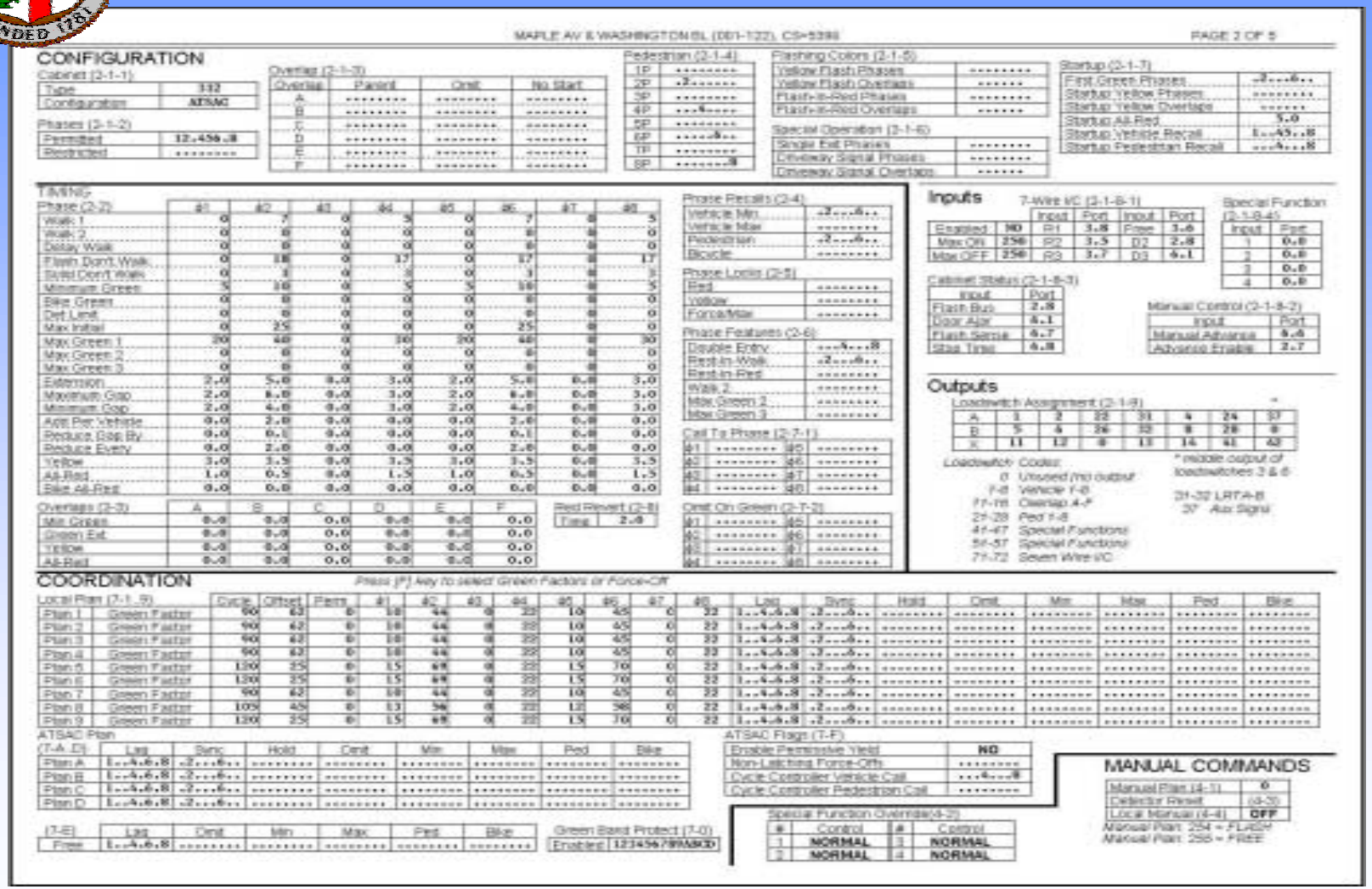
Solar Clock Menu:

```
              SOLAR CLOCK DATA
North Latitude  › 34‹      Today's Times
West Longitude   118     Sunrise 05:38:10
Local Time Zone    8     Sunset  16:52:14
```

TSCP Timing Chart



TSCP Timing Chart



MAPLE AV & WASHINGTON BL (DD1-122), CS=5388 — PAGE 2 OF 5

CONFIGURATION

Cabinet (2-1-1)

Type	332
Configuration	ATSAC

Phases (2-1-2)

Permitted	12,456,8
Restricted	.....

Overlap (2-1-3)

Overlap	Parent	Omit	No Start
A	.....	.....	.....
B	.....	.....	.....
C	.....	.....	.....
D	.....	.....	.....
E	.....	.....	.....
F	.....	.....	.....

Pedestrian (2-1-4)

1P	.....
2P	.2.....
3P	.....
4P	...4.....
5P	.....
6P	.....6...
7P	.....
8P	8

Flashing Colors (2-1-5)

Yellow Flash Phases	.....
Yellow Flash Overlaps	.....
Flash-In-Red Phases	.....
Flash-In-Red Overlaps	.....

Special Operation (2-1-6)

Single Exit Phases	.....
Driveway Signal Phases	.....
Driveway Signal Overlaps	.....

Startup (2-1-7)

First Green Phases	.2....6...
Startup Yellow Phases	.....
Startup Yellow Overlaps	.....
Startup All-Red	5.0
Startup Vehicle Recall	1...45...8
Startup Pedestrian Recall	...4....8

TIMING

Phase (2-2)

	#1	#2	#3	#4	#5	#6	#7	#8
Walk 1	0	7	0	5	0	7	0	5
Walk 2	0	0	0	0	0	0	0	0
Delay Walk	0	0	0	0	0	0	0	0
Flash Don't Walk	0	18	0	17	0	17	0	17
Solid Don't Walk	0	1	0	1	0	1	0	1
Minimum Green	5	10	0	5	5	10	0	5
Bike Green	0	0	0	0	0	0	0	0
Det Limit	0	0	0	0	0	0	0	0
Max Initial	0	25	0	0	0	25	0	0
Max Green 1	20	40	0	30	20	40	0	30
Max Green 2	0	0	0	0	0	0	0	0
Max Green 3	0	0	0	0	0	0	0	0
Extension	2.0	5.0	0.0	3.0	2.0	5.0	0.0	3.0
Maximum Gap	2.0	8.0	0.0	3.0	2.0	8.0	0.0	3.0
Minimum Gap	2.0	4.0	0.0	3.0	2.0	4.0	0.0	3.0
Add Per Vehicle	0.0	2.0	0.0	0.0	0.0	2.0	0.0	0.0
Reduce Gap By	0.0	0.1	0.0	0.0	0.0	0.1	0.0	0.0
Reduce Every	0.0	2.0	0.0	0.0	0.0	2.0	0.0	0.0
Yellow	3.0	3.5	0.0	3.5	3.0	3.5	0.0	3.5
All-Red	1.0	0.5	0.0	1.5	1.0	0.5	0.0	1.5
Bike All-Red	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

Overlaps (2-3)

	A	B	C	D	E	F
Min Green	0.0	0.0	0.0	0.0	0.0	0.0
Green Ext	0.0	0.0	0.0	0.0	0.0	0.0
Yellow	0.0	0.0	0.0	0.0	0.0	0.0
All-Red	0.0	0.0	0.0	0.0	0.0	0.0

Red Rest (2-8)

Ring	2.0

Phase Recalls (2-4)

Vehicle Min	.2....6...
Vehicle Max	.....
Pedestrian	.2....6...
Bicycle	.....

Phase Locks (2-5)

Red	.....
Yellow	.....
Force/Max	.....

Phase Features (2-6)

Double Entry	...4....8
Rest-In-Walk	.2....6...
Rest-In-Red	.....
Walk 2	.....
Max Green 2	.....
Max Green 3	.....

Call To Phase (2-7-1)

#1	.....	#5	.....
#2	.....	#6	.....
#3	.....	#7	.....
#4	.....	#8	.....

Omit On Green (2-7-2)

#1	.....	#5	.....
#2	.....	#6	.....
#3	.....	#7	.....
#4	.....	#8	.....

Inputs

7-Wire I/C (2-1-8-1)

	Input	Port	Input	Port
Enabled	NO	P1	3.8	Flash	3.6
Max ON	250	P2	3.5	D2	2.8
Max OFF	250	P3	3.7	D3	4.1

Special Function (2-1-8-4)

Input	Port
1	0.0
2	0.0
3	0.0
4	0.0

Cabinet Status (2-1-8-3)

Input	Port
Flash Bus	2.8
Door Ajar	4.1
Flash Sense	4.7
Stop Time	4.8

Manual Control (2-1-8-2)

Input	Port
Manual Advance	4.6
Advance Enable	2.7

Outputs

Loadswitch Assignment (2-1-9)

A	1	2	22	31	4	24	37
B	5	6	26	32	8	28	8
X	11	12	0	13	14	41	42

Loadswitch Codes:
0 Unused (no output)
1-8 Vehicle 1-8
11-18 Cleanup 4-P
21-28 Ped 1-8
41-47 Special Functions
51-57 Special Functions
71-72 Seven Wire I/C

* inside output of loadswitches 3 & 6

31-32 LRTA-8
37 Aux Signal

COORDINATION

Press [F] key to select Green Factors or Force-Off

Local Plan (7-1-9)		Cycle	Offset	Perm	#1	#2	#3	#4	#5	#6	#7	#8	Lag	Sync	Hold	Omit	Min	Max	Red	Bike
Plan 1	Green Factor	90	42	0	18	44	0	28	10	45	0	32	1...4.6.8	.2....6...	.....	.....	.....	.....	.....	.....
Plan 2	Green Factor	90	42	0	18	44	0	28	10	45	0	32	1...4.6.8	.2....6...	.....	.....	.....	.....	.....	.....
Plan 3	Green Factor	90	42	0	18	44	0	28	10	45	0	32	1...4.6.8	.2....6...	.....	.....	.....	.....	.....	.....
Plan 4	Green Factor	90	42	0	18	44	0	28	10	45	0	32	1...4.6.8	.2....6...	.....	.....	.....	.....	.....	.....
Plan 5	Green Factor	120	35	0	15	68	0	22	15	70	0	22	1...4.6.8	.2....6...	.....	.....	.....	.....	.....	.....
Plan 6	Green Factor	120	35	0	15	68	0	22	15	70	0	22	1...4.6.8	.2....6...	.....	.....	.....	.....	.....	.....
Plan 7	Green Factor	90	42	0	18	44	0	28	10	45	0	32	1...4.6.8	.2....6...	.....	.....	.....	.....	.....	.....
Plan 8	Green Factor	105	45	0	13	56	0	28	12	58	0	22	1...4.6.8	.2....6...	.....	.....	.....	.....	.....	.....
Plan 9	Green Factor	120	35	0	15	68	0	22	15	70	0	22	1...4.6.8	.2....6...	.....	.....	.....	.....	.....	.....

ATSAC Plan

(7-A-D)	Lag	Sync	Hold	Omit	Min	Max	Red	Bike
Plan A	1...4.6.8	.2....6...	.....	.....	.....	.....	.....	.....
Plan B	1...4.6.8	.2....6...	.....	.....	.....	.....	.....	.....
Plan C	1...4.6.8	.2....6...	.....	.....	.....	.....	.....	.....
Plan D	1...4.6.8	.2....6...	.....	.....	.....	.....	.....	.....

ATSAC Flags (7-F)

Enable Permissive Yield	NO
Non-Latching Force-Offs	.....
Cycle Controller Vehicle Call	...4....8
Cycle Controller Pedestrian Call	.....

(7-E)	Lag	Omit	Min	Max	Ped	Bike
Free	1...4.6.8	.....	.....	.....	.....	.....

Green Band Protect (7-0)

Enabled	123456789ABCD

Special Function Override(4-2)

#	Control	#	Control
1	NORMAL	3	NORMAL
2	NORMAL	4	NORMAL

MANUAL COMMANDS

Manual Plan (4-1)	0
Detector Reset	(4-3)
Local Manual (4-4)	OFF

Manual Plan: 254 = FLASH
Manual Plan: 255 = FREE

Transit Priority System (TSP) Overview

Installation

- Two transit corridors in the City
- 212 TPS traffic signals installed city-wide since 2000

Enhancement to current TSM systems in LADOT

- Provide Traffic Signal Priority to MTA Rapid Buses
- Plan to Provide Traffic Signal Priority to Fire Department Vehicles
- No additional transition required after priority operation
- Priority response within one second of detection
- Early green, Green extension, and Phase hold priority mode

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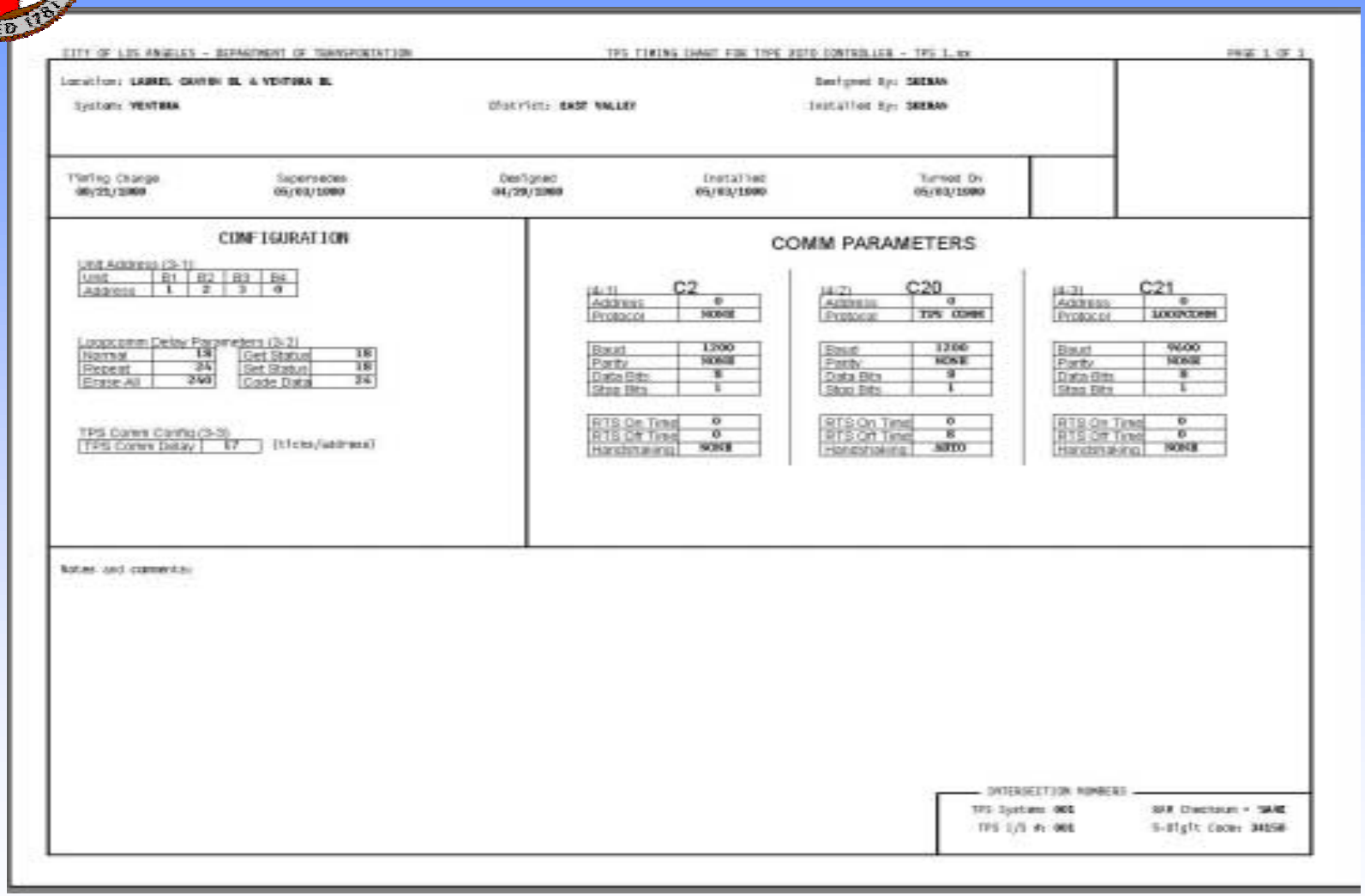
TPS Software Features

- User configurable priority parameters
- Communicates with up to four transponder detector units
- Automatic detector unit failure monitoring
- Support for detector unit configuration
- Detection simulation
- Valid transponder code programming
- High speed serial communications
- RAM check for timing chart data
- Configurable communications port

TPS Timing Chart



CITY OF LOS ANGELES – DEPARTMENT OF TRANSPORTATION — TPS TIMING CHART FOR TYPE 2070 CONTROLLER – TPS 1.xx — PAGE 1 OF 3

Location: LAUREL CANYON BL & VENTURA BL — Designed By: SEEBAN

System: VENTURA — District: EAST VALLEY — Installed By: SEEBAN

Timing Change	Supersedes	Designed	Installed	Turnout On
08/25/1999	05/03/1999	04/29/1999	05/03/1999	05/03/1999

CONFIGURATION

Unit Address (3-1)

Unit	B1	B2	B3	B4
Address	1	2	3	0

Loopback/min Delay Parameters (3-2)

Normal	18	Get Status	18
Repeat	24	Set Status	18
Erase All	240	Code Data	24

TPS Comm Config (3-3)

TPS Comm Delay	17	(ticks/address)

COMM PARAMETERS

(4-1) C2	
Address	0
Protocol	NONE
Baud	1200
Parity	NONE
Data Bits	8
Stop Bits	1
RTS On Time	0
RTS Off Time	0
Handshaking	NONE

(4-7) C20	
Address	0
Protocol	TS% COMM
Baud	1200
Parity	NONE
Data Bits	8
Stop Bits	1
RTS On Time	0
RTS Off Time	0
Handshaking	XOFF

(4-2) C21	
Address	0
Protocol	1000COMM
Baud	9600
Parity	NONE
Data Bits	8
Stop Bits	1
RTS On Time	0
RTS Off Time	0
Handshaking	NONE

Notes and comments:

INTERSECTION NUMBERS

TPS System: 001 — SAM Checksum = SAME

TPS I/O #: 001 — 5-Digit Code: 34150

Startup Manager

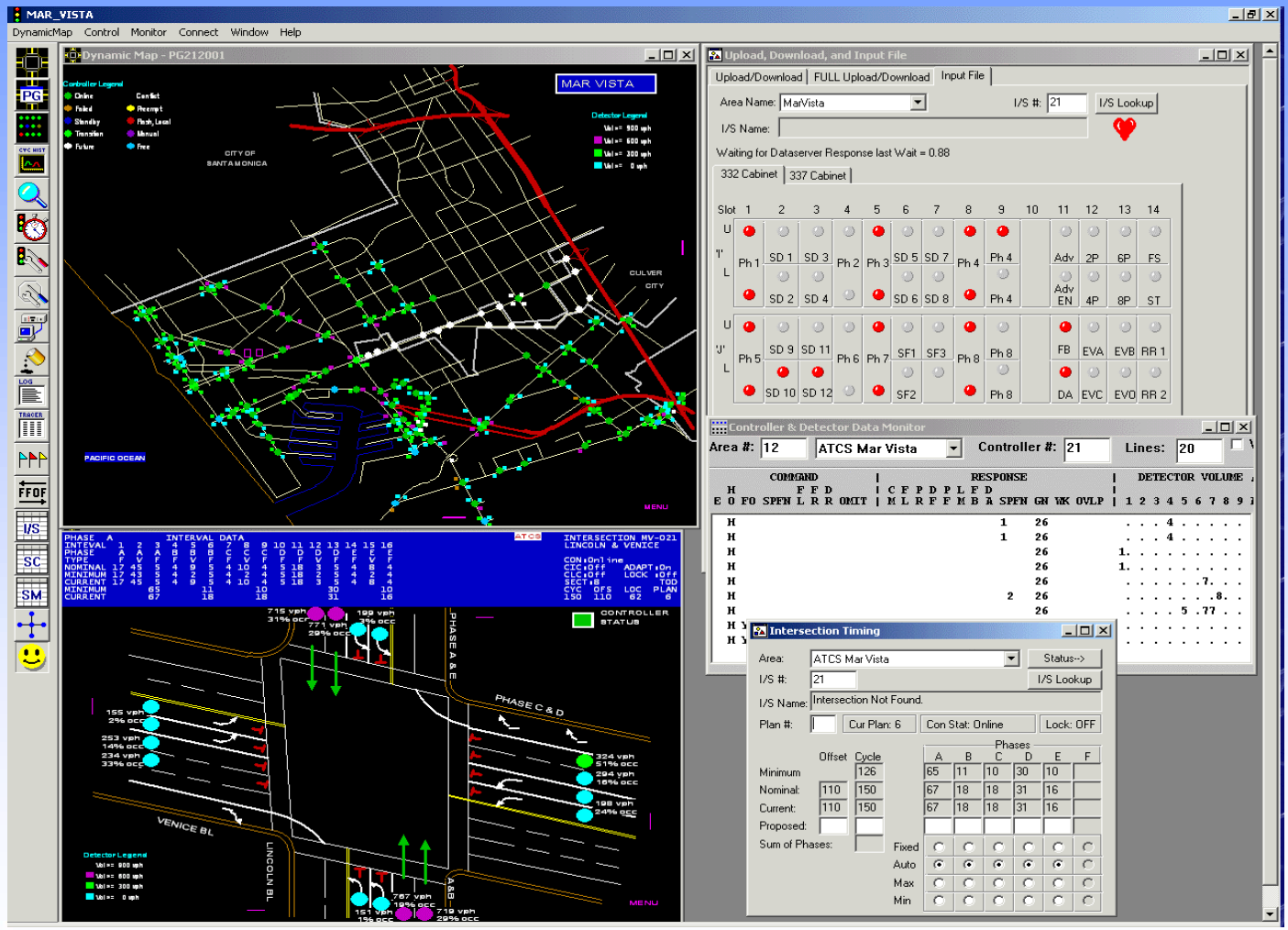
Select 2070 Startup Sequence

Save New Startup Sequence

Enable New Startup Sequence

TSCP and ATCS

Integration with LADOT Adaptive Traffic Control System



TPS and TMS

Integration with LADOT Transit Management System

City of Los Angeles
Department of Transportation

George E. Chen
ATSAC Center
221 North Figueroa Street, Suite 300
Los Angeles CA, 90012

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